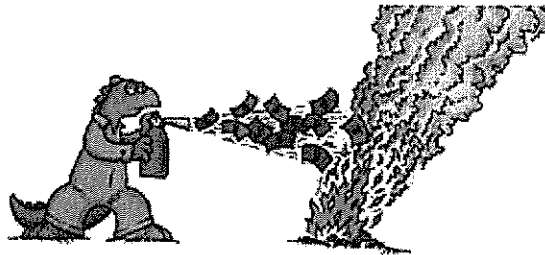


What Are Halons And How Do They Work ?

They are low-toxicity, chemically stable compounds that have been used for fire and explosion protection throughout this century. Today, Halon 1211 (a liquid streaming agent) is used mainly in hand-held fire extinguishers and Halon 1301 (a gaseous agent) is used mainly in total flooding systems. These halons have proven to be extremely effective fire suppressants, which are clean (leave no residue) and remarkably safe for human exposure. Three things must come together at the same time to start a fire. The first ingredient is fuel (anything that can burn), the second is oxygen (normal breathing air is ample) and the last is an ignition source (high heat can cause a fire even without a spark or open flame). Traditionally, to stop a fire you need to remove one side of the triangle - the ignition, the fuel or the oxygen. Halon adds a fourth dimension to fire fighting - breaking the chain reaction. It stops the fuel, the ignition and the oxygen from dancing together by chemically reacting with them. Many people believe that halon displaces the air out of the area it is dispensed in. Wrong! Even for the toughest hazards, less than an 8% concentration by volume is required. There is still plenty of air to use in the evacuation process



Who Uses Halons?

Historically, the largest single user of halon has been the electronics industry. The protection of vital electronics facilities, such as computer rooms and communications rooms, is estimated to account for 65% of Halon 1301 use. The U.S. Government uses halon for military applications (in ships, aircraft and tanks), for protecting fragile historical documents such as the Bill of Rights, and even protection of the President's limousine. Halons are also used extensively in oil production, electric power generation, and are required on all commercial passenger aircraft. Manufacturers who make everything from dolls to cars use halon to protect their personnel and products.

How Long Has Halon Been Used For Fire Protection?

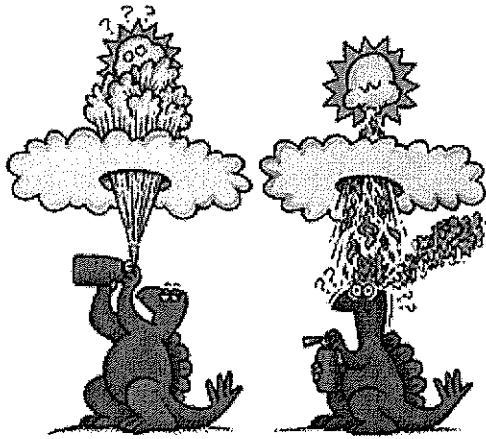
Carbon tetrachloride (Halon 104) was used prior to 1900, even though its combustion by-products were lethal. Due to a number of deaths, a search for something safer began. Several other halons were tried, but it was not until 1947 that research by the Purdue Research Foundation and the U.S. Army resulted in the discovery of two effective low toxicity halons: 1211 and 1301. When used properly, these halons have an excellent fire fighting record with little, if any, risk.

How Damaging Is Halon?

A compound's ability to destroy ozone depends on many factors, including the amount of chlorine and/or bromine that it contains. To aid them in comparing compounds, scientists have developed a relative scale called the ozone depletion potential (ODP). Common refrigerants, like those found in your refrigerator and in your car air conditioner, have been assigned the value 1 as a reference. Halon 1301 has the value between 10 and 16, meaning it has 10-16 times the more potential for destroying the ozone layer.

Halon use worldwide is significantly less than that of CFCs, so even though it is more damaging to the

ozone layer, there is not as much of it released into the atmosphere. In fact, it is estimated that overall halons account for less than 20% of ozone depletion.



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What Alternatives Are There?

There are a number of traditional fire extinguishing agents, such as water, carbon dioxide, dry chemicals, and foam that are good alternatives to halons for many applications. In addition, recent research has led to the commercialization of new agents and technologies. These fall into four basic categories: halocarbon compounds; inert gas mixtures; water-mist or fogging systems; and powdered aerosols. The growing list of alternatives to halon, in conjunction with advanced detection and fire resistant materials, provides protection from a broad spectrum of potential hazards. For more information on halon replacement agents, see the March 1996 report (revision 12) of the EPA Questions and Answers on Halon and their Substitutes, or contact HARC.

What Is HARC?

The Halon Alternatives Research Corporation (HARC) was formed to focus efforts for finding suitable alternatives for the halons used in fire fighting. It is also the major industry association providing information to the user community on halon-related issues. HARC has facilitated and encouraged the involvement of the fire protection community in environmentally responsible activities, including:

- Coordinated development of an Industry Code of Practice for the best use of recycled halon.
- Assisted in development of EPA Public Education Brochures.
- Sponsored major conferences on aviation fire safety and alternative technologies.
- Sponsored workshop on toxicological issues related to halocarbon replacements.
- Sponsored research on halon bank management leading to the formation of the Halon Recycling Corporation (HRC).

HARC is now in its seventh year, and during that time has developed a unique, cooperative working relationship with government agencies concerned with the halon/CFC issue. For more information contact HARC at the telephone or fax numbers listed in this brochure.



Can Halon Be Recycled?

Unlike aluminum cans or newspapers, once halon is released it is virtually impossible to recover. If halon is still contained in cylinders retired from service or if a container is leaking, the halon can be recovered for reuse. In fact, some halon distributors and users have been doing this for many years, long before halon emissions were identified as an environmental problem. Current legislation prohibits the production or importation of new Halon 1211, 1301, or 2402 into the U.S.. Recycled halon is now the only source of supply.

It can be obtained from a number of sources, including fire equipment distributors and independent recyclers. Industry, in conjunction with EPA, formed a non-profit organization to assist in halon recycling. The Halon Recycling Corporation (HRC) acts as a facilitating organization by providing information services to match companies who have a surplus of halon with those companies who have an ongoing need for the fire fighting agent. For more information contact HRC at the telephone or fax number listed in this brochure.

What Is Industry Doing About Halon Use?

When the environmental effects of halon became known, industrial users of halon and fire protection professionals worked together to limit halon use and emissions. Through changes in standards and specifications, industry has virtually eliminated its use of halon for testing and training purposes. Historically, testing and training has been responsible for the majority of halon emissions. Many companies have also implemented programs to reduce false discharges due to human error and equipment failure. Safety training and awareness programs in conjunction with advances in detection and control systems have contributed greatly to reduction in emissions. Many organizations that continue to rely on halon systems for fire protection have instituted programs to identify their most critical needs. Halons that can be removed from non-critical or obsolete facilities are then recovered for use in more critical applications.



Is Halon Use Restricted?

Although some states are banning the sale of certain hand-held extinguishers for non-commercial uses, the answer is generally no. However, effective January 1, 1994, the production and importation of new halon was banned in the developed world by international agreement. Careful use and conservation of halon is, therefore, important so that existing supplies will be sufficient to meet all future needs.

For More Information

On halon alternatives and regulations, contact: The Halon Alternatives Research Corporation (HARC)

Phone: (703) 524-6636

Fax: (703) 243-2874

E-mail: cortina@alcalde-fay.com

On halon recycling and banking, contact: The Halon Recycling Corporation (HRC)

Phone: (800) 258-1283

Fax: (703) 243-2874

E-mail: cortina@alcalde-fay.com

Or visit the HARC home page at <http://www.harc.org/>

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Approved Alternatives

Under its Significant New Alternatives Policy (SNAP) program, the U.S. Environmental Protection Agency (EPA) is required to evaluate alternative chemicals and processes intended to be used in place of ozone-depleting substances to ensure that they are acceptable from a human health and environmental perspective. Available below for download as pdf files are tables that list all of the agents that are considered acceptable as halon alternatives under EPA's SNAP program.

Acceptable Alternatives for Halon 1211 (Streaming Agents)
Acceptable Alternatives for Halon 1301 (Total Flooding Agents)
Alternative Manufacturers

HALON ALTERNATIVE
MANUFACTURERS

3M
John Schuster
3M Center Building, 223-6S-04
St. Paul, MN 55144-1000
651-736-6055
651-736-7542(fax)
jmschuster1@mmm.com
**C6F14 (CEA-614); C4F10 (CEA-410);
C3F8 (CEA-308); C6-fluoroketone (Novec
1230)**

ADI Technologies, Inc.
Jerry Brown
1487 Chain Bridge Road, Suite 204
McLean, VA 22101
703-734-9626
703-448-8591(fax)
adit22101@aol.com
Powdered Aerosol A (SFE)

Aerojet, Rocket Research Company
Paul Wierenga
11441 Willows Road, NE
P.O. Box 97009
Redmond, WA 98052
425-885-5000
425-882-5804(fax)
pwiereng@rocket.com
Inert Gas/Powdered Aerosol Blend

Ajay North America
Steve Newhouse
6855 E. Swarthmore
Anaheim Hills, CA 92807
714-685-9920
714-685-9921(fax)
cf3l@concentric.net
CF3I (Triiodide)

American Pacific Corporation
Halotron Division
Jeff Gibson
3770 Howard Hughes Parkway
Suite 300
Las Vegas, NV 89109
702-735-2200
702-735-4876(fax)
halotron@apfc.com
**HCFC Blend B (Halotron I)
Halotron II**

BF Goodrich Aerospace
Don Olander
25401 N. Central Avenue
Phoenix, AZ 85027-7899
623-516-3340
623-516-3364(fax)
Don.Olander@goodrich.com
Goodrich 244

Ansul Fire Protection
Joe Ziemba
1240 Iroquois Drive, Suite 102
Naperville, IL 60563-8537
630-305-5700
630-305-3360(fax)
jziemba@tyco.int.com
IG-541 (INERGEN)

DuPont Fluoroproducts
Greg Rubin
Chestnut Run Plaza
P.O. Box 80702
Wilmington, DE 19880-0702
302-999-3779
302-255-0267(fax)
greg.m.rubin@usa.dupont.com
**HFC-23 (FE-13); HFC-125 (FE-25);
HCFC-124 (FE-241); HFC-236fa (FE-36);
HCFC-123 (FE-232); HFC-227ea (FE-227)**

Firefreeze Worldwide, Inc.
Stephanie Giessler
270 Route 46 East
Rockaway, NJ 07866
973-627-0722
973-627-2982(fax)
info@firefreeze.com
Surfactant Blend A (ColdFire)

Ginge-Kerr Danmark A/S
Rudolf Klitte
111, Stamholmen
DK-2650 Hvidovre
Denmark
45-3777-1131
45-3677-2231(fax)
ginge-kerr@ginge-kerr.dk
IG-55 (Argonite)

Great Lakes Chemical Corporation
Al Thornton
P.O. Box 2200
West Lafayette, IN 47906
765-497-6270
765-497-5432(fax)
athornto@glcc.com
HFC-227ea (FM-200)

International Management Services
Corporation
Joseph Brown
8298 D Old Courthouse Road
Vienna, VA 22182
703-448-4487
703-847-6430(fax)
imscorp@ix.netcom.com
Powdered Aerosol C (Soyuz)

Koatsu Company, Ltd.
Nobuo Yamada
310, Kitahonmachi
I-Chome, Itami
Hyogo 664-0836, Japan
817-2782-8564
817-2782-8414(fax)
yamada@koatsu.co.jp
IG-100 (NN100)

Minimax GmbH
Wolfgang Koch
Industriestrasse 10/12
23840 Bad Oldesloe, Germany
49-4531-803443
49-4531-803500(fax)
w.koch@minimax.de
IG-01 (Argotec)

N2 Towers Inc.
Adam Richardson
2872 Bristol Circle,
Oakville, Ontario, Canada
L6H 5T5
905-829-1083
905-829-5988(fax)
Adam.Richardson@N2Towers.com
**N2 Tower Inert Gas Generator Fire
Suppression System**

Nohmi Bosai Ltd.
Tadashi Tanoue
7-3, Kudan-Minami
4-chome, Chiyoda-ku
Tokyo 102-8277, Japan
813-3265-0232
813-3265-9228(fax)
tanoue@nohmi.co.jp
IG-100 (NN100)

NAF International/Safety Hi-Tech
Giuliano Indovino
Via degli Olmetti, 58-Zona Industriale
00060 Formello (RM)
Italy
3906-907-751
3906-907-7555(fax)
giu.indovino@safetyhitech.com
**HCFC Blend A (NAF S-III)
HCFC Blend C (NAF P-III);
HCFC Blend D (Blitz)
HCFC Blend E (NAF P-IV)
NAF S-125**

Powsus Inc.
Harry Stewart
3120 North A1A, #1403
Fort Pierce, FL 34949
561-460-8729
561-460-8730(fax)
hstewart@powsus.com
**Gelled Halocarbon/Dry Chemical
Suspension (Envirogel)**

Pyrogen Corporation
Julia Berezovsky
18 Barry Avenue
Mortdale NSW 2223
Australia
612-9586-3200
612-9586-3211(fax)
julia@fl.net.au
Powdered Aerosol C (PyroGen)

TABLE 2

ACCEPTABLE HALON ALTERNATIVES UNDER EPA'S SNAP PROGRAM

Steaming Agents

AGENT	CONDITIONS	COMMENTS
HCFC Blend B (Halotron I)	See use restrictions A	See additional comments 1,2,3,4.
HCFC - 123 (FE-232)	See use restrictions A	See additional comments 1,2,3,4.
C ₆ F ₁₄ (CEA-614)	See use restrictions A,C	See additional comments 1,2,3,4.
HCFC Blend C (NAF P-III)	See use restrictions A	See additional comments 1,2,3,4.
HCFC Blend D (Blitz III)	See use restrictions A	See additional comments 1,2,3,4.
HCFC Blend E (NAF P-IV)	See use restrictions A	See additional comments 1,2,3,4.
HCFC-124 (FE-241)	See use restrictions A	See additional comments 1,2,3,4.
CF ₃ I (Triiodide)	See use restrictions A	See additional comments 1,2,3,4.
HFC-227ea (FM-200, FE-227)	See use restrictions A	See additional comments 1,2,3,4.
HFC-236fa (FE-36)	See use restrictions B	See additional comments, 1,2,3,4,5.
C6-fluoroketone (Novec 1230)	See use restrictions A	See additional comments 1,2,3,4.
H Galden HFPEs	See use restrictions A	See additional comments 1,2,3,4.
Gelled Halocarbon/Dry Chemical Suspension (Envirogel)		Allowable in residential applications.
Water Mist		Potable water, natural seawater
Surfactant Blend A (Cold Fire)		Not a clean agent, but can reduce quantity of water needed to extinguish a fire.
Carbon Dioxide, Dry Chemical, Water, Foam		
<div> <div>Additional Comments</div> <ol style="list-style-type: none"> Discharge testing and training should be strictly limited only to that which is essential to meet safety or performance requirements. The agent should be recovered from the fire protection system in conjunction with testing or servicing, and recycled for later use or destroyed. EPA has no intention of duplicating or displacing OSHA coverage related to the use of personal protective equipment (e.g. respiratory protection), fire protection, hazard communication, worker training or any other occupational safety and health standard with respect to halon substitutes. As with other steaming agents, EPA recommends that potential risks of combustion by-products be labelled on the extinguisher (see UL 2129). Acceptable for local application systems inside textile process machinery. </div> <div> <div>Use Restrictions</div> <ol style="list-style-type: none"> Non-residential use only. Acceptable in non-residential uses when manufactured using any process that does not convert perfluoroisobutylene (PFIB) directly to HFC-236fa in a single step. Acceptable where other alternatives are not technically feasible due to performance or safety requirements: <ol style="list-style-type: none"> because of their physical or chemical properties, or where human exposure to the extinguishing agents may result in failure to meet applicable use conditions. </div>		

EPA EVALUATING NEW ALTERNATIVES

EPA is currently evaluating some newly proposed alternatives for halons. Goodrich 244 is pyrochemically generated aerosol that produces potassium bromide as the extinguishant. It is being developed by B.F. Goodrich Aerospace as a potential replacement for halons in aircraft cargo compartments, maritime engine rooms, and

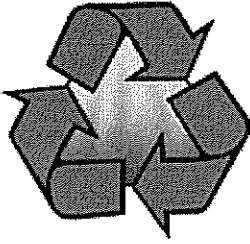
similar large total flooding applications. NAF S-125 is a blend of HFC-125 and a small amount of limonene, which is intended to decrease the amount of HF produced during decomposition. NAF S-125 is manufactured by Safety Hi-Tech as a replacement for halons in total flooding applications. N₂ Tower Inert Gas Generator Fire Suppression Systems utilize non-azide solid propellant pre-packed canisters inside a total flood delivery system, which generate nitrogen to inert and suppress a fire in a normally occupied area.

TABLE 1

ACCEPTABLE HALON ALTERNATIVES UNDER EPA'S SNAP PROGRAM

Total Flooding Agents

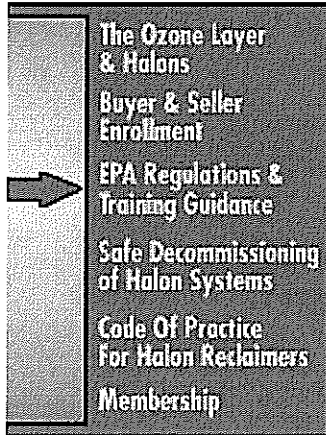
AGENT	CONDITIONS	COMMENTS	Additional Comments
IG-01 (Argotec)		See safety recommendation 1. See additional comments 1,2,5.	<ol style="list-style-type: none"> Should conform with relevant OSHA requirements, including 29 CFR 1910, Subpart 1910.160 and 1910.162. Per OSHA requirements, protective gear (SCBA) should be available in the event personnel should reenter the area. Discharge testing should be strictly limited to that which is essential to meet safety or performance requirements. The agent should be recovered from the fire protection system in conjunction with testing or servicing, and recycled for later use or destroyed. EPA has no intention of duplicating or displacing OSHA coverage related to the use of personal protective equipment (e.g. respiratory protection), fire protection, hazard communication, worker training or any other occupational safety and health standard with respect to halon substitutes. The NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems gives guidelines for blends that contain HFC-134a or HFC-22 and other acceptable total flooding agents, rather than referring to HFC-134a or HFC-22 alone.
IG-55 (Argonite)		See safety recommendation 1. See additional comments 1,2,5.	
IG-100 (NN100)		See safety recommendation 1. See additional comments 1,2,5.	
IG-541 (Inergen)		See safety recommendation 1. See additional comments 1,2,5. This agent contains CO ₂ , which is intended to increase blood oxygenation and cerebral blood flow in low oxygen atmospheres. The design concentration should result in no more than 5% CO ₂ .	
HFC-227ea (FM-200, FE-227)		See safety recommendation 1. See additional comments 1,2,3,4,5.	
HFC-125 (FE-25)		See safety recommendation 1. See additional comments 1,2,3,4,5.	
HFC-23 (FE-13)		See safety recommendation 1. See additional comments 1,2,3,4,5.	<p>Safety Recommendations</p> <ol style="list-style-type: none"> Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems. <p>Narrowed use Limits</p> <ol style="list-style-type: none"> Acceptable when manufactured using any process that does not convert perfluoroisobutylene (PFIB) directly to HFC-236fa in a single step, for use in explosion suppression and explosion inerting applications, and for use in fire suppression applications where other non-PFC agents or alternatives are not technically feasible due to performance or safety requirements: <ol style="list-style-type: none"> because of their physical or chemical properties, or where human exposure to the extinguishing agents may result in failure to meet safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems. Acceptable for non-residential uses where other alternatives are not technically feasible due to performance or safety requirements: <ol style="list-style-type: none"> because of their physical or chemical properties, or where human exposure to the extinguishing agents may result in failure to meet safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems.
HCFC-124 (FE-241)		See safety recommendation 1. See additional comments 1,2,3,4,5.	
HCFC-Blend A (NAF S-III)		See safety recommendation 1. See additional comments 1,2,3,4,5.	
HFC-134a		Use of blends containing this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems. See additional comments 1,2,3,4,5,6.	
HCFC-22		Use of blends containing this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems. See additional comments 1,2,3,4,5,6.	
HFC-236fa (FE-36)	See narrowed use limits A.	See safety recommendation 1. See additional comments 1,2,3,4,5.	
C ₃ F ₈ (CEA-308)	See narrowed use limits B.	See safety recommendation 1. See additional comments 1,2,3,4,5.	
C ₄ F ₁₀ (CEA-410)	See narrowed use limits B.	See safety recommendation 1. See additional comments 1,2,3,4,5.	
CF ₃ I (Triiodide)	Use only in normally unoccupied areas.	See safety recommendation 1. See additional comments 1,2,3,4,5.	
Halotron II	Use only in normally unoccupied areas.	See safety recommendation 1. See additional comments 1,2,3,4,5.	
C6-fluoroketone (Novec 1230)		See safety recommendation 1. See additional comments 1,2,3,4,5.	
HFC227-BC	Sodium bicarbonate release in all settings should be targeted so that increased pH level would not adversely affect exposed individuals. Users should provide special training to individuals required to be in environments protected by HFC227-BC extinguishing systems. Each HFC227-BC extinguisher should be clearly labeled with the potential hazards from use and safe handling procedures.	Use of the agent, HFC227ea, should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems. See additional comments 1,2,3,4,5.	
Envirogel with ammonium polyphosphate additive		Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems, for whichever hydrofluorocarbon gas is employed. See additional comments 1,2,3,4,5.	
Envirogel with any additive other than ammonium polyphosphate	Use only in normally unoccupied areas.	Use of this agent should be in accordance with the safety guidelines in the latest edition of the NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems, for whichever hydrofluorocarbon gas is employed. See additional comments 1,2,3,4,5.	
Water Mist	Potable water, natural seawater	See NFPA 750	
Insert Gas/Powdered Aerosol Blend (FS 0140)	Unoccupied areas only.	See additional comment 2.	
Powdered Aerosol A (SFE)	Unoccupied areas only.		
Powdered Aerosol C (PyroGen, Soyuz)	Unoccupied areas only.		
Carbon Dioxide			



HALON RECYCLING CORPORATION

2111 Wilson Boulevard 8th Floor Arlington, VA 22201 1.800.258.1283

Home



Contact

EPA Regulations & Training Guidance

On March 5, 1998, the U. S. Environmental Protection Agency issued a final rule covering the sale of halon blends and the handling and disposal of halon and halon-containing equipment (63 FR 11084). The major elements of the rule are summarized below:

- A ban on the manufacture of any halon blend. An exemption is provided for halon blends manufactured solely for the purpose of aviation fire protection.
- A prohibition on the intentional release or venting of halons during testing, maintaining, servicing, repairing, or disposing of halon-containing equipment or during the use of such equipment for technician training.
- A prohibition on halon releases that occur as a result of owner failure to maintain halon-containing equipment to relevant industry standards.
- A requirement that technician training relevant to halon emissions be provided. Technicians should be trained using standard industry service practice guidelines, including NFPA, ISO and ASTM publications.
- A requirement that halon and halon-containing equipment must be properly disposed of at the end of its useful life. Proper disposal is defined as sending such equipment for halon recovery or recycling by a facility operating in accordance with NFPA 10 and NFPA 12A standards or destruction using one of several processes identified in the rule.

In February 2001 EPA published a guidance document on the technician training and proper disposal requirements of the March 1998 rule.

[Click here to download the March 1998 EPA final rule on halon recycling.](#)

[Click here to download the February 2001 EPA guidance document.](#)

The Halon Recycling Corporation (HRC) is a voluntary, non-profit trade association formed by concerned halon users and the fire protection industry to support the goals of the environmental community and the United States Environmental Protection Agency (EPA). Its function is to assist users of halon fire fighting chemicals to redeploy the existing bank of halons from applications where alternatives are feasible to those unique situations that still require halons. HRC can assist you in selling your halons, or help you to find halons to keep your critical systems functional. HRC will also keep you informed about changes in international and domestic regulations that can impact continued halon use.

HRC Missions

Facilitate Halon Recycling - HRC acts as a facilitating organization for the recycling of Halon 1211 and 1301 by providing information services to match companies that have excess halons with those companies that need the fire fighting agents for critical uses.

Determine Critical Use - HRC provides guidelines and procedures for a self determination of critical halon use. HRC also provides an independent review and critical use certification if requested.

Information Clearinghouse - HRC acts as an information clearinghouse by providing accurate, up-to-date information on all issues related to halon recycling.

Recycling "Umbrella" Organization - HRC serves as the umbrella organization for halon recycling in the United States. HRC acts as the contact point both nationally and internationally for U.S. halon recycling and banking, and also serves as the focal point for industry/government interaction on halon recycling issues.

Recycling Advocacy Organization - HRC represents the interests of halon reclaimers and critical users of recycled halon, including the preparation of comments on proposed recycling and import regulations and support for market-based approaches to controlling emissions.